Amendments to the Drawings:

AMEND FIG 1 to include element 25 see attached.

REMARKS

In the Office Action dated November 13, 2006, the Examiner objected to the drawings, objected to claims 8, 12, 14, 17, 25, 26, 29 and 37 for minor informalities, rejected claims 1-23 and 28-38 under 35 USC 112, second paragraph, as being indefinite, rejected claims 8, 11, and 36 under 35 USC 112, first paragraph, for failure to comply with the enablement requirement, rejected claims 1-3, 6-19, 21, 22, 24-32, and 35-38 under 35 USC 102 as anticipated by Graham in US Patent 5,914,709, rejected claims 1-3, 6-9, 12-22, 24, 28-32, 37 and 38 under 35 USC 102 as anticipated by Francis in US Patent 6,181,842, rejected claims 4, 5, 33 and 34 under 35 USC 103 as obvious over Graham, rejected claim 20 under 35 USC 103 as obvious over Graham and Francis, rejected claim 23 under 35 USC 103 as obvious over Graham and Hashino in US Publication 2002/0030668, rejected 4, 5, 33, 34 under 35 USC 103 as obvious over Francis, and rejected claims 1-3, 8, 14, 15, 28, 29 and 32 on the grounds of non-statuatory obviousness-type double patenting. In response thereto, the Applicant has amended claims 2-5, 8, 12, 14, 17, 19, 25, 26, 29, 32-34 and 37 Claims 1-38 remain at issue.

The Drawings

The Examiner objected to the drawings for failing to show some of the claimed features. Each of the noted claimed features are addressed below.

Claim 11: Paragraph [0019] has been amended to make it clear that the processor 24 is performing the filtering. The processor 24 is already illustrated in Figure 1. No new matter has been added. No drawing corrections are required.

Claim 14: "a light transmitter having facet" has been deleted from the claim. With regard to the "LED", the "with facets" limitation has been removed. In paragraph [0016] of the specification, the light sources 16 and 18 as illustrated in Figure 1 are described as possibly being LEDs in accordance with one embodiment. No drawing corrections are required.

Claims 23: Figure 1 has been amended to include a sleep mode element 25. Paragraph [0021] describes in detail the sleep mode embodiment of the present invention. No new matter has been added.

35 USC 112, Second Paragraph Objections

The Applicant has amended claims 8, 12, 14, 17, 25, 26, 29, and 37 to correct the minor informalities noted by the Examiner.

35 USC 112 Second Paragraph Rejections

As per claims 1-23 and 28-38, the Applicants strongly disagrees with the Examiner's conclusion that a "lamina of light" is not a physical element. It is a well-established principal of physics that light is electromagnetic radiation and the elementary particles that define light are photons. As a physical entity, light is characterized by a number of parameters, including amplitude, frequency and polarization, all of which may be detected and/or measured. See the attached definition of light printed from the Wikopedia's web site http://en.wikipedia.org/wiki/Light. Therefore, light is in fact a physical element. The Examiner's rejection is improper and should be withdrawn.

With regard to claims 2 and 32, the Applicants disagree with the Examiner's rejection. Paragraph [0027] specifically recites that the lamina generated by the present invention is either one, two, or three dimensions. The Examiner's rejection is therefore improper and should be withdrawn.

As per claims 4, 5, 8, 12, 19, 33, 34 and 37, these claims have been amended to correct the minor informalities noted by the Examiner.

35 USC 112 First Paragraph Rejections

The subject matter of claim 8 regarding the wavelength of the lamina of light is fully supported by the specification. See specifically paragraph [0018].

The subject matter of claims 11 and 36 regarding a filtering device configured to subtract ambient light from measured light is fully described in paragraph [0019].

The Art Rejection

The Examiner has rejected certain claims as anticipated by Graham. The Applicants strongly disagree. Graham fails to teach or even suggest the present invention as claimed.

Graham is directed to an input device that uses a grid of light. Throughout Graham, there are numerous teachings that the reference is specifically directed to an input device that relies on a grid of light, not a lamina of light. For example:

> In column 1 lines 64-66, Graham specifically states that the invention is a user input device that uses "***a grid of light***";
>
> With reference to Figure 1, Graham teaches in column 4 lines 12-15 that "*the waveguides 104 redirect the incoming light into* ***a plurality of light beams 106*** *...*"

With reference to Figure 3, Graham teaches in column 5 lines 27-28 that "*the input device 300 produces* ***numerous parallel light beams****, and at the other two sides, the input device 300 receives numerous* ***parallel light beams****.*";

With reference to Figure 4, Graham teaches in column 6 lines 31-34 that each of the "*waveguides within the waveguide section 410 produces* ***a horizontal beam of light 418*** *that traverses across the screen area of the display device …*";

With reference to Figure 5, Graham teaches in column 7 lines 62-64 that "*When light 506 is applied to the end of a waveguide section 502,* ***a plurality of light beams 508*** *are formed …*";

With regard to Figures 10B and 10C, Graham shows light beams represented by arrows for shadow detection. See column 12 lines 23-67; and

Lastly, with regard to Figures 11A and 11B, Graham teaches the use of a collimated ***light beam 1106***. See column 13, line 32.

There is no teaching whatsoever in Graham of using a lamina of light for an input device.

The Examiner has also rejected certain claims as anticipated by Francis. The Applicants strongly disagree. Francis fails to teach or even suggest the present invention as claimed. For example:

In the Summary of the Invention, Francis discusses an input device with waveguides sending a generally "***parallel array of unconstrained light beams*** …." See column 2 lines 6-8;

With regard to Figure 1A, Francis describes and illustrates X ***light beams 15X*** and Y ***light beams 15Y***. See column 5 lines 6-20. Similarly with regard to Figure 1B, Francis discusses ***collimated light beams***. See column 5, line 52;

With regard to Figure 3, element 33C is described as a "***convex***" surface that acts as a "***first collimating stage***" of the send optical system. See column 6 lines 33-34;

With regard to Figure 10A, lens 108L is used for "***improved collimation***". See column 11 line 42-59; and

Lastly with regard to Figure 11, nine lenses (A through I) are provided to enhance ***collimation***. See column 12 lines 19-28.

The Francis input device therefore relies on collimated light beams, not a lamina of light. There is no teaching whatsoever in Francis for using a lamina of light for an input device.

Graham or Francis, either alone or in combination fail to, teach or suggest the use of a lamina of light for an input device. On the contrary, Graham and Francis both teach the use of collimated light beams to form a grid of light. As noted above, a grid of light is made up from a plurality of discrete beams of collimated light, whereas, a lamina of light is substantially continuous. The claims of the present application are therefore not anticipated by either reference.

The Double Patenting Rejection

The Applicant strongly disagrees with the Examiner's double patenting rejection. The claims of the present invention are directed to an input device using a lamina of light. In contrast, the claims of the Graham 7,099,553 patent are directed specifically to the waveguides having multi-faceted surfaces used for creating a lamina of light. The claims of the present application are therefore patentably distinct over and the 7,099,553 patent.

Applicant believes that all pending claims are allowable and respectfully requests a Notice of Allowance for this application from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the telephone number set out below.

Respectfully submitted,
BEYER WEAVER & THOMAS, LLP

/jwr/

James W. Rose
Reg. No. 34,239

P.O. Box 70250
Oakland, CA 94612-0250
650-961-8300

Light

From Wikipedia, the free encyclopedia

Prism splitting light

Light is electromagnetic radiation with a wavelength that is visible to the eye (**visible light**) or, in a technical or scientific context, electromagnetic radiation of any wavelength[1] (http://www.lightsources.org/cms/?pid=1000166). The elementary particle that defines light is the photon. The three basic dimensions of light (i.e., all electromagnetic radiation) are:

- Intensity (or amplitude), which is related to the human perception of brightness of the light,
- Frequency (or wavelength), perceived by humans as the colour of the light, and
- Polarization (or angle of vibration), which is only weakly perceptible by humans under ordinary circumstances.

Due to the wave-particle duality of matter, light simultaneously exhibits properties of both waves and particles. The precise nature of light is one of the key questions of modern physics.

Contents

Visible electromagnetic radiation

The visible spectrum is the portion of the electromagnetic spectrum that is visible to the human eye, referred to as the Balmer series. Electromagnetic radiation in this range of wavelengths is called visible light or simply light. There are no exact bounds to the visible spectrum; a typical human eye will respond to wavelengths from 400 to 700 nm, although some people may be able to perceive wavelengths from 380 to 780 nm. A light-adapted eye typically has its maximum sensitivity at around 555 nm, in the green region of the optical spectrum (see: luminosity function). The spectrum does not, however, contain all the colours that the human eyes and brain can distinguish. Brown and pink are absent, for example. See Colour to understand why.

The *optical spectrum* includes not only visible light, but also infrared and ultraviolet.

Speed of light

The speed of light in a vacuum is exactly 299,792,458 metres per second (fixed by definition). Although some people speak of the "velocity of light", the word *velocity* is usually reserved for vector quantities, which have a direction.

The speed of light has been measured many times, by many physicists. The best early measurement in Europe is by Ole Rømer, a Danish physicist, in 1676. By observing the motions of Jupiter and one of its moons, Io, with a telescope, and noting discrepancies in the apparent period of Io's orbit, Rømer calculated that light takes about 18 minutes to traverse the diameter of Earth's orbit. If he had known the diameter of the orbit in kilometres (which he didn't) he would have deduced a speed of 227,000 kilometres per second (approximately 141,050 miles per second).

The first successful measurement of the speed of light in Europe using an earthbound apparatus was carried out by Hippolyte Fizeau in 1849. Fizeau directed a beam of light at a mirror several thousand metres away, and placed a rotating cog wheel in the path of the beam from the source to the mirror and back again. At a certain rate of rotation, the beam could pass through one gap in the wheel on the way out and the next gap on the way back. Knowing the distance to the mirror, the number of teeth on the wheel, and the rate of rotation, Fizeau measured the speed of light as 313,000 kilometres per second.

Léon Foucault used rotating mirrors to obtain a value of 298,000 km/s (about 185,000 miles/s) in 1862. Albert A. Michelson conducted experiments on the speed of light from 1877 until his death in 1931. He refined Foucault's results in 1926 using improved rotating mirrors to measure the time it took light to make a round trip from Mt. Wilson to Mt. San Antonio in California. The precise measurements yielded a speed of 186,285 mi/s (299,796 km/s [1,079,265,600 km/h]). In daily use, the figures are rounded off to 300,000 km/s and 186,000 miles/s.

Refraction

All light propagates at a finite speed. Even moving observers always measure the same value of c, the speed of light in vacuum, as $c = 299{,}792{,}458$ metres per second (186,282.397 miles per second). When light passes through a transparent substance, such as air, water or glass, its speed is reduced, and it undergoes refraction. The reduction of the speed of light in a denser material can be indicated by the refractive index, n, which is defined as:

$$n = \frac{c}{v}$$

Thus, $n = 1$ in a vacuum and $n > 1$ in matter.

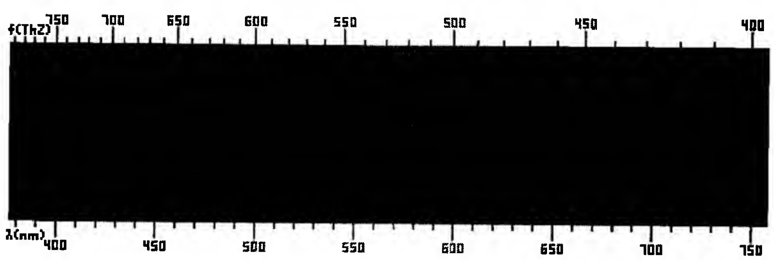
When a beam of light enters a medium from vacuum or another medium, it keeps the same frequency and changes its wavelength. If the incident beam is not orthogonal to the edge between the media, the direction of the beam will change. Refraction of light by lenses is used to focus light in magnifying glasses, spectacles and contact lenses, microscopes and refracting telescopes.

Optics

The study of light and the interaction of light and matter is termed optics. The observation and study of optical phenomena such as rainbows offers many clues as to the nature of light as well as much enjoyment.

Colour and wavelength

The different wavelengths are detected by the human eye and then interpreted by the brain as colours, ranging from red at the longest wavelengths of about 700 nm to violet at the shortest wavelengths of about 400 nm. The intervening frequencies are seen as orange, yellow, green, and blue.



The wavelengths of the electromagnetic spectrum immediately outside the range that the human eye is able to perceive are called *ultraviolet* (UV) at the short wavelength (high frequency) end and *infrared* (IR) at the long wavelength (low frequency) end. Some animals, such as bees, can see UV radiation while others, such as pit viper snakes, can see infrared light.

UV radiation is not normally directly perceived by humans except in a very delayed fashion, as overexposure of the skin to UV light can cause sunburn, or skin cancer, and underexposure can cause vitamin D deficiency. However, because UV is a higher frequency radiation than visible light, it very easily can cause materials to fluoresce visible light.

Cameras that can detect IR and convert it to light are called, depending on their application, night-vision cameras or infrared cameras. These are different from image intensifier cameras, which only amplify available visible light.

When intense radiation (of any frequency) is absorbed in the skin, it causes heating that can be felt. Since hot objects are strong sources of infrared radiation, IR radiation is commonly associated with this sensation. Any intense radiation that can be absorbed in the skin will have the same effect, however.

Measurement of light

The following quantities and units are used to measure the quantity or "brightness" of light.

SI photometry units